

## CLAIMS

1. Production process for branched fatty acids, characterized in that said branched fatty acids are produced from at least one plant cell or from one plant material or from a plant comprising at least one plant cell, said plant cell comprising in its genome a recombinant nucleic acid coding for a product which induces or stimulates the synthesis of branched fatty acid(s).
2. Process according to Claim 1, characterized in that it comprises in addition an extraction step of the branched fatty acids.
3. Process according to Claim 2, characterized in that it comprises in addition a treatment step of the extracted branched fatty acids.
4. Process according to <sup>Claim 1</sup> ~~one of the Claims 1 to 3~~, characterized in that the recombinant nucleic acid codes for a product which induces or stimulates the post-synthetic branching of the fatty acids produced by said cell.
5. Process according to Claim 4, characterized in that the recombinant nucleic acid codes for an enzyme permitting the transfer of one or more alkyl groups to the double bond(s) of the unsaturated fatty acids.
6. Process according to Claim 5, characterized in that the recombinant nucleic acid codes for a methyl transferase.

7. Process according to Claim 5, characterized in that the recombinant nucleic acid codes for a cyclopropane fatty acid synthase.

5 8. Process according to one of the Claims 4 to 7, characterized in that the plant cell comprises in addition a recombinant nucleic acid coding for SAM synthetase.

10 9. Process according to one of the Claims 1 to 3, characterized in that the recombinant nucleic acid codes for an enzyme which forces said plant cell to use a substrate comprising more than 3 carbon atoms for the synthesis of the aliphatic chain.

15 10. Process according to Claim 9, characterized in that the recombinant nucleic acid codes for an enzyme capable of forcing the plant to use a non-linear acyl-CoA, such as in particular methylmalonyl CoA.

20 11. Process according to Claim 10, characterized in that the recombinant nucleic acid codes for a malonyl CoA decarboxylase.

12. Recombinant nucleic acid characterized in that it comprises :  
- a nucleic acid coding for a product which induces or stimulates the synthesis of branched fatty acid(s),

- a promoter regulating the expression of said nucleic acid and capable of causing the localized expression of this nucleic acid in certain plant tissues or certain plant parts, and,

- a 3' transcription termination region.

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13. Nucleic acid according to Claim 12, characterized in that the promoter is a promoter capable of causing localized expression of the nucleic acid in the seed of a plant.

10 14. Recombinant nucleic acid comprising :

-a nucleic acid coding for a methyl transferase capable of catalyzing the transfer of a methyl group to an aliphatic chain of an unsaturated fatty acid,

- a functional promoter in the plant cells regulating the expression of said nucleic acid, and

15 - a 3' transcription termination region.

15. Recombinant nucleic acid comprising:

- a nucleic acid coding for an enzyme which forces a plant cell to use a substrate comprising more than 3 carbon atoms as substrate for the synthesis of the aliphatic chain, in particular for a malonyl CoA decarboxylase,

- a functional promoter in the plant cells regulating the expression of said nucleic acid, and

- a 3' transcription termination region.

16. Recombinant nucleic acid according to any one of the Claims 12 to 15, characterized in that its sequence comprises in addition a nucleic acid coding for the SAM synthetase.

5 17. Vector comprising a recombinant nucleic acid according to any one of the Claims 12 to 16.

18. Plant cell comprising a recombinant nucleic acid such as defined in one of the Claims 12 to 16 or a vector according to Claim 17.

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sub 34 19. Plant cell according to Claim 18, characterized in that it is an oleaginous plant cell, preferably selected from colza, sunflower, peanut, soya, flax and maize.

15 20. Transgenic plant characterized in that it contains at least one cell according to Claim 18 or 19.

20 21. Transgenic plant characterized in that it contains in at least one part at least of its cells, a nucleic acid according to the Claims 12 to 16 or a vector according to Claim 17.

22. Production process for branched fatty acids by cell culture of a plant cell according to either of the Claims 18 or 19 comprising:

- the culture of these cells in a medium suitable for their growth,

- the extraction and purification of the branched fatty acids from the cells or from the supernatant of said culture.

23 Preparation process for branched fatty acids from a transgenic plant whose cells contain a recombinant nucleic acid according to any one of the Claims 12 to 16, characterized in that it comprises :

- the field culture of said transgenic plants;
- the recovery of the seeds of said plants;
- the extraction of the fatty acids from these seeds.

24. Use of a transgenic plant according to Claim 20 or 21, regenerated from a cell according to either of the Claims 18 or 19, for the production of branched fatty acids.

25. Use of the whole or part of a transgenic plant, at least some of the cells of which contain a recombinant nucleic acid according to Claim 12 for the production of branched fatty acids.

26. Branched fatty acids which can be obtained by the process of any one of the Claims 1 to 11, 22 or 24.

27. Composition containing branched fatty acids obtained by the process of any one of the Claims 1 to 11, 22 or 24.

28. Use of a branched fatty acid ester which can be obtained by the process of any one of the Claims 1 to 11, 22 or 23 for the preparation of a lubricant composition.

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- 5 29. Preparation process of a transgenic plant capable of producing branched fatty acids, comprising the introduction of a recombinant nucleic acid such as defined in Claim 12 into a plant cell or part of a plant and the regeneration of a transgenic plant from these plant cells or parts of plants.

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